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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/728,845

12/08/2003

Yoko Mitarai

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EXAMINER

MCNELIS, KATHLEEN A

ART UNIT

PAPER NUMBER

1742

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/728,845	Applicant(s) MITARAI ET AL.	
	Examiner Kathleen A. McNelis	Art Unit 1742	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 July 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 9-14 is/are pending in the application.
- 4a) Of the above claim(s) 11-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9 and 10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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### **Claims Status**

Claims 9-14 remain for examination wherein claims 9 and 10 are amended and claims 11-14 are withdrawn.

### **Acknowledgement of RCE**

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.115, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 07/05/2007 has been entered.

### **Status of Previous Rejections**

The following rejections are withdrawn in view of cancellation of the claims:

Claims 15 and 16 under 35 U.S.C. 103(a) as being unpatentable over Koizumi et al. (U.S. Pat. No. 6,071,470).

The following rejections are maintained:

Claims 9 and 10 under 35 U.S.C. 103(a) as being unpatentable over Koizumi et al. (U.S. Pat. No. 6,071,470).

### **DETAILED ACTION**

#### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koizumi et al. (U.S. Pat. No. 6,071,470).

Koizumi et al. is applied as set forth in the 02/05/2007 Office action.

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With respect to the amended limitation to claim 9, Koizumi et al. discloses that the range for additive element (corresponding to (B) in present invention) is from 5 to 20 atomic %. Koizumi et al. teaches that nickel may be partially substituted for Rh to reduce the specific gravity and cost of the superalloy (col. 2 lines 49-52). In examples, Koizumi et al. discloses alloys with 15% additive; balance Rh (col. 4 lines 1-20). The range of partial nickel substitution would therefore be limited to: from 0% to less than 85% (amount of Rh present), whereas the Rh content would range from 95 (at 5% additive, no Ni) to 0% (Ni fully substituted for Rh). Values can be selected from these ranges which are within the claimed range of (A) to (B) of from 0.25:1 to 12:1, where (A) corresponds to Ni and B corresponds to Nb or Ta in Koizumi et al., therefore a prima facie case of obviousness exists (M.P.E.P § 2144.05).

With respect to the amended limitation to claim 10, Koizumi et al. discloses from 2 to 22 atomic % of an additive element, where the additive element is Nb or Ta (corresponding to claim 16 (B)) or aluminum (corresponding to claim 16 (D)) (col. 2 lines 1-9). The range of 2 to 22 atomic % is within the claimed range of less than or equal 25 atomic %. The balance of the alloy is Rh or a mixture of Rh and Ir (corresponding to claim 16 (C)) alone or partially substituted with Ni (corresponding to claim 16 (A)) as discussed above regarding claims 9 and 10. The total sum of Rh, Ir and Ni is therefore at least 78 atomic % (i.e. 100 % - 22%), which is within the claimed range of at least 75%.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gu et al. (1998) in view of Selman et al. (U.S. Pat. No. 4,683,119).

Gu et al. discloses a Ni-based superalloy having fcc and L1<sub>2</sub> two phase structures of composition Ir-15Nb-XNi (p. 723) where values of X are disclosed from 10 to 50 at% (Table 1, p. 724). Note, examiner contends that the column heading "N" in Table 1 is a typographical error and

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should read “Nb”, as evidenced by Introduction, Figure 2, Results and Discussion and Conclusion. The range of 10 to 50 at% Ni is within the claimed range of between 5 to 65 at% Ni. 15 at% Nb is within the claimed range of 5 to 20 at% Nb. Alloys A-D (Table 1 p. 724) disclose Ir content of bal., which when calculated ranges between 35 and 75 at%, which is within the claimed range of between 30 to 75 at%.

Although Gu et al. does not recite that the amount of the  $L_{12}$  phase is between 20 and 80 volume %, such would be expected since the compositions disclosed by Gu et al. are within the claimed ranges of the instant invention (see M.P.E.P. 2112.01 II). Further, Gu et al. discloses homogenization heat treatment at 1573 K (i.e. about 1300 °C) for 168 hours (i.e. about 1 week) (p. 724) which appears to be the same as the aging heat treatment for 1 week at 1300 °C disclosed on p. 14 of the instant invention, therefore the same results would be expected following heat treatment.

The ratio of Ni (A in instant invention) to Nb (B in instant invention) in alloys A-D of Gu et al. are respectively 0.67:1 (alloy A), 1.3:1 (alloy B), 2:1 (alloy C) and 3.3:1 (alloy D), which satisfy the relationship that the ratio of A to B is from 0.25:1 to 12:1.

Gu et al. does not disclose the addition of Rh or Ta.

Selman et al. discloses the addition of a platinum group metal to a nickel and/or cobalt superalloy to increase the high temperature strength and creep resistance (col. 1 lines 45-57). Selman discloses alloys containing at least 40wt% Ni or Co, optional chromium and up to 15% of one or more of the platinum group metals (Pt, Pd, Rh, Ir, Os and Ru) (col. 1 lines 10-21 and lines 58-68). Selman discloses that the cast nickel based alloys owe the improved strength to solid solution strengthening of the  $\gamma$  matrix and increasing the volume percentage of the  $\gamma'$  precipitate

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(i.e. L1<sub>2</sub> phase), commonly between 50-60% (col. 5 lines 29-40), which is within the range of 20 to 80%.

Selman et al. teaches that the platinum group metals (Pt, Pd, Rh, Ir, Os and Ru) are substitutes in the disclosed compositions (col. 1 lines 61 – col. 2 line 20) therefore substitution of Rh for Ir would have been an obvious modification to one of ordinary skill in the art at the time the invention was made (See M.P.E.P. 2144.06).

Selman et al. teaches that the addition of refractory metals improves the strength of the alloys (col. 5 lines 29-43) and discloses the addition of up to 10 wt% Ta (i.e. a refractory metal, col. 1 line 65 – col. 2 line 20). In an example alloy M, 4 wt% Ta (corresponding to about 9.2 at%) is added, which is within the range of between 5 to 20 at%. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add Ta as taught by Selman et al. to the alloy of Gu et al. (1998) as a refractory metal to improve alloy strength as taught by Selman et al. Further, since both Nb and Ta are refractory metals the substitution of Ta for all or part of Nb in Gu et al. (1998) would also have been obvious in view of Selman et al.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gu et al. (1998) in Selman et al. (U.S. Pat. No. 4,683,119) and WO 97/38144 (WO '144).

Gu et al. in view of Selman et al. is applied as discussed above regarding claim 9.

Gu et al. does not disclose the addition of between 4 and 13 at% Al.

WO '144 discloses an improvement to Ni, Fe and Co based superalloys by partially replacing Ni with Pd (abstract). WO '144 teaches that Al and Ti, primarily Al are added to Ni alloys to improve oxidation resistance and strength (p. 3 lines 9-11) and discloses the addition of up to 10 wt% Al in the inventive superalloys (p. 19 claim 2). Although WO '144 discloses the addition of Pd as opposed to Ir, Selman et al. discloses that Pt, Pd, Rh, Ir, Os and Ru are

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substitutes in the same field of endeavor (col. 1 lines 61 – col. 2 line 20). Further, Selman et al. discloses that similar cast nickel based alloys containing refractory metals owe improved strength at least in part to solid solution strengthening of the  $\gamma$  matrix with 50-60% of  $\gamma'$  precipitate, such increase caused by the addition of aluminum and titanium (col. 5 lines 29-40); therefore the addition of Al would have been obvious to one of ordinary skill in the art to improve strength. Since Pd and Ir are substitutes as taught by Selman et al., one of ordinary skill in the art would have reasonable expectation of success in using Al as taught by WO '144 in the Gu et al. alloy containing Ir to improve oxidization resistance and strength as taught by WO '144 based on the teaching of WO '144 of adding Al to a nickel based superalloy containing Pd. Values can be selected from the range of up to 10 wt% Al which when substituted into the alloys disclosed by Gu et al. are within the claimed range of 4-13 at% Al. For example, substitution of about 1 wt% Al into alloy C of Gu et al. would correspond to about 5 at% Al. Values can be selected from Gu et al. in view of Selman et al. and WO '144 which satisfy the relationships (A) + (C) (i.e. Ni + Rh + Ir)  $\geq$  75 at% and (B) + (D) (i.e. Nb + Ta + Al)  $\leq$  25 at%.

#### **Additional Citations**

The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Physical Metallurgy Principles (Reed-Hill) provides evidence that the  $\gamma$  matrix of a nickel-based superalloy is f.c.c. and the  $\gamma'$  precipitate is an ordered f.c.c. compound based on the formula  $\text{Ni}_3(\text{Al}, \text{Ti})$  as evidenced by Reed-Hill (p. 719).

#### ***Response to Arguments***

Applicant has amended claims 9 and 10 by incorporating the limitations of now canceled depending claims 15 and 16.

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Examiner has addressed the amendment above in the grounds for rejection.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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